

CLAIMS

What is claimed is:

1. A method of warning the operator of a primary vehicle about the potential collision of a closing vehicle with the primary vehicle, the closing vehicle proceeding in the same direction as the primary vehicle, said method comprising:

(a) determining one or more parameters about the state of movement of the primary vehicle;

(b) determining one or more parameters about the state of movement of the closing vehicle; and

(c) generating an alert to the operator of the primary vehicle when the one or more parameters of the primary vehicle and the one or more parameters of the closing vehicle are at a predetermined status.

2. A method of warning the operator of a primary vehicle about the potential collision of a closing vehicle with the primary vehicle, the closing vehicle proceeding in the same direction as the primary vehicle, said method comprising:

(a) determining the pattern of speed variations of the primary vehicle during a predetermined time interval;

(b) determining the state of the transmission of the primary vehicle during said predetermined time interval;

(c) determining one or more parameters about the state of the movement of the

closing vehicle; and

(d) generating an alert to the operator of the primary vehicle when (1) the said pattern corresponds to a predetermined pattern indicative of a particular driving maneuver, (2) the said one or more parameters of the state of movement of the closing vehicle are at a predetermined status; and/or (3) another condition exists.

3. The method as defined by Claim 2 wherein said another condition is the manual activation of the alert function.

4. The method as defined by Claim 2 wherein said another condition is the radar acquisition of a target vehicle within said predetermined time interval or the manual activation of the traffic alert function.

5. The method as defined by Claim 2 wherein the parameter of the state of movement of the closing vehicle is dependent upon the speed of the closing vehicle.

6. The method as defined by Claim 2 wherein the parameter of the state of the movement of the trailing vehicle is dependent upon the distance of the closing vehicle from the primary vehicle.

7. The method as defined by Claim 2 wherein said predetermined pattern indicative of a particular driving maneuver comprise a speed variation pattern indicative of a U-turn maneuver.
- 5 8. The method as defined by Claim 2 wherein said predetermined pattern indicative of a particular driving maneuver comprise a speed variation pattern indicative of a maneuver returning to travel after a period of being stopped.
9. The method as defined by Claim 8 wherein said pattern comprises a pattern including
10 a transition of a primary vehicle gear selector from a "Park" or "Neutral" position to a "Drive" position.
10. The method as defined by Claim 2 wherein said predetermined status of one or more parameters of the state of movement of the closing vehicle comprise a status selected
15 from the group of exceeding a maximum closing vehicle speed, exceeding a maximum difference in speed between the primary vehicle and the closing vehicle, failing to meet a minimum range from the primary vehicle to the closing vehicle, and failing to meet a minimum time to collision.
- 20 11. The method as defined by Claim 2 wherein said primary vehicle is selected from the group of a police cruiser, a highway patrol vehicle, a law enforcement vehicle, an ambulance, a fire response vehicle, a maintenance vehicle, and a utility vehicle.

12. The method as defined by Claim 2 wherein said step of determining the pattern of speed variations of the primary vehicle during a predetermined time interval is performed by a police radar unit.

5 13. The method as defined by Claim 2 wherein said step of determining the state of the transmission of the primary vehicle during said predetermined time interval is performed by a police radar unit.

10 14. The method as defined by Claim 2 wherein said step of determining one or more parameters about the state of the movement of the closing vehicle is performed by a police radar unit.

15 15. The method as defined by Claim 2 wherein said step of generating an alert to the operator of the primary vehicle comprises generating an alert via a police radar unit user interface.

20 16. The method as defined by Claim 15 wherein said step of generating an alert via a police radar unit user interface comprises a step selected from the group of issuing an audible signal, issuing a visual indicator, and issuing both an audible signal and a visual indicator.

17. In a police traffic radar unit having a plurality of functions for measuring and

determining conditions for a primary vehicle and for at least one closing vehicle, said police traffic unit being installed on said primary vehicle, a traffic alert method comprising:

determining if one or more pre-determined preliminary traffic hazard conditions with respect to said primary vehicle are met or exceeded;

responsive to determination of existing preliminary conditions, determining if one or more pre-determined ancillary traffic hazard conditions with respect to a closing vehicle are met or exceeded; and

issuing an alert to an operator of said primary vehicle responsive to determining meeting or exceeding said ancillary traffic hazard conditions.

18. The method as set forth in Claim 17 comprising the step of providing a microprocessor software function for a Doppler Direction Sensing police radar unit configured to perform said steps of determining if one or more preliminary conditions exist, determining if one or more ancillary conditions exist, and issuing an alert to an operator.

19. The method as set forth in Claim 17 further comprising providing one or more user-configurable preferences to affect logic and thresholds of said steps of determining preliminary and determining ancillary conditions.

20. The method as set forth in Claim 17 wherein said step of determining if one or more

pre-determined preliminary conditions are met or exceeded comprises determining if a condition is met or exceeded selected from the group of a relatively sudden slowing from a current primary vehicle speed to a speed characteristic of a U-turn maneuver and subsequently returning to a greater speed; a primary vehicle gear selector being in a “Drive” state during monitored velocity transitions; and manual activation of a traffic alert check control by a user.

21. The method as set forth in Claim 17 wherein said step of determining if one or more pre-determined preliminary conditions are met or exceeded comprises determining if a condition is met or exceeded selected from the group of an increase from a primary vehicle initial speed which is stopped or nearly stopped to a subsequent speed indicative of a return to traffic speeds; a change from a primary vehicle gear selection from “Park” or “Neutral” to “Drive” indicative of returning to traffic or pursuit speeds; a recent radar acquisition of secondary vehicle within a specified recent period of time indicative of a speed enforcement activity; and manual activation of a traffic alert check control by a user.

22. The method as set forth in Claim 17 wherein said step of determining if one or more pre-determined ancillary conditions are met or exceeded comprises a step selected from the group of determining that the speed of a closing vehicle exceeds a maximum preferred real speed; determining that the speed of a closing vehicle exceeds a maximum preferred speed relative to the primary speed; determining that a distance to

a closing vehicle from the primary vehicle position is less than a minimum preferred distance; and determining that an estimated time to collision with a closing vehicle is less than a minimum preferred time value.

- 5 23. The method as set forth in Claim 17 wherein said step of issuing an alert to said law enforcement officer comprises a step selected from the group of providing a visual indicator, providing an audible indicator, and providing both visual and audible indicators.
- 10 24. In a police traffic radar unit having a plurality of functions for measuring and determining conditions for a primary vehicle and for at least one closing vehicle, said police traffic unit being installed on said primary vehicle, a traffic alert system comprising:
- 15 a means for determining if one or more pre-determined preliminary traffic hazard conditions with respect to said primary vehicle are met or exceeded;
- a means for, responsive to determination of existing preliminary conditions, determining if one or more pre-determined ancillary traffic hazard conditions with respect to a closing vehicle are met or exceeded; and
- 20 a means for issuing an alert to an operator of said primary vehicle responsive to determining meeting or exceeding said ancillary traffic hazard conditions.
25. The system as set forth in Claim 24 further comprising a means for providing one or

more user-configurable preferences to affect logic and thresholds of said means for determining preliminary and means for determining ancillary conditions.

26. The system as set forth in Claim 24 wherein said means for determining if one or
5 more pre-determined preliminary conditions are met or exceeded comprises a means
selected from the group of a means for detecting relatively sudden slowing from a
current primary vehicle speed to a speed characteristic of a U-turn maneuver and
subsequently returning to a greater speed; a means for detecting a primary vehicle
gear selector being in a "Drive" state during monitored velocity transitions; and a
10 manual activation of a traffic alert check control by a user.

27. The system as set forth in Claim 24 wherein said means for determining if one or
more pre-determined preliminary conditions are met or exceeded comprises a means
selected from the group of a means for detecting an increase from a primary vehicle
15 initial speed which is stopped or nearly stopped to a subsequent speed indicative of a
return to traffic speeds; a means for detecting a change from a primary vehicle gear
selection from "Park" or "Neutral" to "Drive" indicative of returning to traffic or
pursuit speeds; a means for detecting a recent radar acquisition of secondary vehicle
within a specified recent period of time indicative of a speed enforcement activity;
20 and a manual activation of a traffic alert check control by a user.

28. The system as set forth in Claim 24 wherein said means for determining if one or

more pre-determined ancillary conditions are met or exceeded comprises a means selected from the group of a means for determining that the speed of a closing vehicle exceeds a maximum preferred real speed; a means for determining that the speed of a closing vehicle exceeds a maximum preferred speed relative to the primary speed; a means for determining that a distance to a closing vehicle from the primary vehicle position is less than a minimum preferred distance; and a means for determining that an estimated time to collision with a closing vehicle is less than a minimum preferred time value.

10 29. The system as set forth in Claim 24 wherein said means for issuing an alert to said primary vehicle operator comprises a means selected from the group of a visual indicator, an audible indicator, and a combination visual and audible indicator.

15 30. A traffic alert system associated with a primary vehicle comprising:
 one or more inputs adapted to receive state information regarding a closing vehicle from a police radar unit, at least of one said inputs being configured to receive a speed estimate of said closing vehicle;
 an analyzer adapted to determine if one or more pre-determined preliminary traffic hazard conditions with respect to said primary vehicle are met or exceeded,
20 and further adapted to determine if one or more pre-determined ancillary traffic hazard conditions with respect to a closing vehicle are met or exceeded based upon said received state information; and

an operator alerting device configured to provide an alert indication to an operator of said primary vehicle responsive to determination of existence of said preliminary and ancillary conditions.

- 5 31. The system as set forth in Claim 30 further comprising one or more user-configurable preferences to affect logic and thresholds of said analyzer.
32. The system as set forth in Claim 30 wherein said one or more inputs comprise at least one input selected from the group of a primary vehicle speed estimate, a direction
10 sense of a closing vehicle, and a range estimate from said primary vehicle to said closing vehicle.
33. The system as set forth in Claim 32 wherein said analyzer is adapted to detect a
 a preliminary condition selected from the group of a speed pattern of a
15 relatively sudden slowing from a current primary vehicle speed to a speed characteristic of a U-turn maneuver and subsequently returning to a greater speed; a primary vehicle gear selector being in a “Drive” state during monitored velocity transitions; and a manual activation of a traffic alert check control by a user.

34. The system as set forth in Claim 32 wherein said analyzer is adapted to detect a preliminary condition selected from the group of a speed pattern of a primary vehicle initial speed which is stopped or nearly stopped to a subsequent speed indicative of a return to traffic speeds; a gear shifting pattern of a change from a primary vehicle gear selection from "Park" or "Neutral" to "Drive" indicative of returning to traffic or pursuit speeds; a recent radar acquisition of secondary vehicle within a specified recent period of time indicative of a speed enforcement activity; and a manual activation of a traffic alert check control by a user.

35. The system as set forth in Claim 32 wherein said analyzer is adapted to perform an analysis selected from the group of determining that the speed of a closing vehicle exceeds a maximum preferred real speed; determining that the speed of a closing vehicle exceeds a maximum preferred speed relative to the primary speed; determining that a distance to a closing vehicle from the primary vehicle position is less than a minimum preferred distance; and determining that an estimated time to collision with a closing vehicle is less than a minimum preferred time value.

36. The system as set forth in Claim 32 wherein said operator alerting device comprises a device selected from the group of a visual indicator, an audible annunciator, and a combination visual indicator and audible annunciator.